



# **SMA-iMX6**

## **Reliability Prediction Report**

### **(MTBF)**

MTBF Number : EMTBF- SMA-iMX6  
Release Date : 2014/02/11

<b>Initiated by</b>	Jeffery Chen	<b>Job Title</b>	Senior Engineer	<b>Originate Date</b>	2014/02/11
<b>Approved by</b>	Max Chen	<b>Job Title</b>	Supervisor	<b>Revision</b>	QD4-069 Rev.A2

---

# Reliability Prediction(MTBF)

---

I. Model Name : SMA-iMX6

Description :

- Freescale ®i.MX6 Cortex-A9 Quad/Dual Lite/Solo CPU, 24-bit/1ch LVDS, 1 x Gigabit Ethernet, 512MB/1GB system memory, 12x GPIO, 2x SDIO, 4x I<sup>2</sup>C, 2x I<sup>2</sup>S, 2x SPI, SPDIF, WDT, 2x CAN Camera Interface (PCAM, CSI), 2x RX/TX (Ser1/3) (RTS/CTS share with GPIO) 2x UART (Ser0/2), 1x USB 2.0, 1x USB OTG, Power requirement +3.0~5.25V

II. Predication Date : 2014/02/11

III. Prediction Site : Avalue Technology Software – DQV Dept.

IV. Predicted by : Jeffery Chen

V. Simulation Environment :

- Temperature : 30°C
- Standard : Telcordia Issue 2

VI. Prediction Result :

- Failure Rate : See next pages
- MTBF : See next pages



## Reliability Prediction Summary

**File Name:** SMA-iMX6.rfp  
**System:** E9697A96101R  
**Ref Des:**  
**Calculation Model:** Telcordia Issue 2

**Failure Rate:** 1.352008  
**MTBF (hrs):** 739,640  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Assembly Name	Part Number	Ref Des	Quantity	Failure Rate	MTBF
SMA-iMX6	E9697A96101R		1	1.352008	739,640

**File Name:** SMA-iMX6.rfp  
**Assembly:** E9697A96101R  
**Ref Des:**  
**Description:** Freescale i.MX6 SMARC Module

**Failure Rate:** 1.352008  
**MTBF (hrs):** 739,640  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Unit Failure Rate	Quantity	Total Failure Rate
E1050501030H	Resistor	R198,R203,R409,R421,R425	0.000849	5	0.004975
E1050501040H	Resistor	R403,R415,R464	0.000849	3	0.003115
E1050501530H	Resistor	R417	0.000849	1	0.001181
E1050501620H	Resistor	R179	0.000849	1	0.001181
E1050501840H	Resistor	R458	0.000849	1	0.001181
E1050502000H	Resistor	R30,R35	0.000849	2	0.002163
E1050502010H	Resistor	R180,R205,R206	0.000849	3	0.003115
E1050502020H	Resistor	R237	0.000849	1	0.001181
E1050502030H	Resistor	R419,R459	0.000849	2	0.002163
E1050502410H	Resistor	R199~R202,R208	0.000849	5	0.004975
E1050503040H	Resistor	R356	0.000849	1	0.001181
E1050506830H	Resistor	R465,R466	0.000849	2	0.002163
E1050512410H	Resistor	R258	0.000849	1	0.001181
E1050517430H	Resistor	R412	0.000849	1	0.001181
E1050519100H	Resistor	R177	0.000849	1	0.001181
E1050545320H	Resistor	R407	0.000849	1	0.001181
E1050549920H	Resistor	R463	0.000849	1	0.001181
E1050554920H	Resistor	R411	0.000849	1	0.001181
E1050560410H	Resistor	R147,R148	0.000849	2	0.002163
E1050566510H	Resistor	R423	0.000849	1	0.001181
E1050576800H	Resistor	R204,R207	0.000849	2	0.002163
E1050580610H	Resistor	R420	0.000849	1	0.001181

**File Name:** SMA-iMX6.rfp  
**Assembly:** E9697A96101R  
**Ref Des:**

**Description:** Freescale i.MX6 SMARC Module

**Failure Rate:** 1.352008  
**MTBF (hrs):** 739,640  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Unit Failure Rate	Quantity	Total Failure Rate
E1050700000H	Resistor	R14,R16,R17,R19,R22~R27,R29,R33,R41,R43,R45,R46,R48,R50,R53,R55,R57~R60,R73,R74,R76,R80,R82,R84~R89,R92,R94,R99~R107,R109,R110,R112,R114,R115,R117,R118,R120,R122,R123,R125,R127,R129,R132~R139,R141~R146,R149~R166,R168,R169,R171~R176,R182,R192,R194,R209~R21	0.000849	168	0.146782
E1050701020H	Resistor	R228,R233,R267,R294	0.000849	4	0.004050
E1050701030H	Resistor	R245,R247,R248,R263~R265,R341,R349,R352,R357,R362,R370,R371,R373,R406,R416,R418,R424,R432~R435,R438~R440,R498	0.000849	26	0.023706

File Name: SMA-iMX6.rfp

Assembly: E9697A96101R

Ref Des:

Description: Freescale i.MX6 SMARC Module

Failure Rate: 1.352008

MTBF (hrs): 739,640

Temperature: 30

Environment: GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Unit Failure Rate	Quantity	Total Failure Rate
E1050701040H	Resistor	R266,R34 5,R346,R3 51,R354,R 355,R358 ~R361,R3 64,R365,R 368,R372, R374~R3 77,R379,R 380,R382, R384~R3 86,R422,R 455,R481	0.000849	27	0.024586
E1050701050H	Resistor	R257	0.000849	1	0.001181
E1050702010H	Resistor	R61,R62,R 65,R68	0.000849	4	0.004050
E1050702050H	Resistor	R186	0.000849	1	0.001181
E1050702200H	Resistor	R485~R4 90	0.000849	6	0.005892
E1050702220H	Resistor	R311~R3 13,R317,R 318,R324, R329,R33 0,R342,R3 44,R363,R 367,R442, R444,R50 0	0.000849	15	0.013975
E1050703630H	Resistor	R337~R3 40,R348,R 378,R381, R383	0.000849	8	0.007712
E1050704720H	Resistor	R181,R22 9,R231,R2 32,R234,R 236,R238 ~R243,R2 50,R254,R 270~R281 ,R286,R28 8,R290,R2 91,R395,R 396,R429 ~R431,R4 53,R454,R 476,R491	0.000849	39	0.035110
E1050704730H	Resistor	R389,R40 1,R484	0.000849	3	0.003115

**File Name:** SMA-iMX6.rfp  
**Assembly:** E9697A96101R  
**Ref Des:**

**Description:** Freescale i.MX6 SMARC Module

**Failure Rate:** 1.352008

**MTBF (hrs):** 739,640

**Temperature:** 30

**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Unit Failure Rate	Quantity	Total Failure Rate
E1051700001H	Resistor	R188,R190,R193,R195~R197,R244,R246,R249	0.000849	9	0.008601
E1052700002H	Resistor	R495,R496	0.000849	2	0.002163
E1060701031H	Resistor	RN1~RN8	0.000849	8	0.007712
E11215224A0H-M1	Capacitor	C1,C2,C4~C10,C12,C13,C44,C45,C47,C48,C51~C53,C56,C57,C59,C60,C62,C64~C67,C70~C77,C79~C87,C90~C103,C105,C106,C109~C114,C172~C178,C182,C183	0.000376	75	0.029034
E1121610610H	Capacitor	C21,C254,C259,C262,C265,C267,C337,C341,C346,C352,C362,C393,C395	0.000376	13	0.005231
E1121622500H	Capacitor	C115,C323,C396	0.000376	3	0.001294



**File Name:** SMA-iMX6.rfp  
**Assembly:** E9697A96101R  
**Ref Des:**

**Description:** Freescale i.MX6 SMARC Module

**Failure Rate:** 1.352008

**MTBF (hrs):** 739,640

**Temperature:** 30

**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Unit Failure Rate	Quantity	Total Failure Rate
E1121622610H	Capacitor	C49,C50,C54,C55,C58,C68,C69,C78,C88,C89,C104,C107,C108,C116~C118,C130~C132,C134~C137,C169,C170,C220,C234,C271,C280,C283,C285,C288,C290,C293,C295,C359,C378,C397~C401	0.000376	42	0.016413
E1121647500H	Capacitor	C18,C23,C28,C30,C32,C34,C36,C40,C303,C307,C308,C311~C317,C319,C327,C333,C342,C348	0.000376	23	0.009105
E1122510500H	Capacitor	C210,C301,C302,C304~C306,C309,C310,C320~C322,C330,C336,C345,C351,C367,C368,C377,C394,C408,C409,C411	0.000376	22	0.008719

**File Name:** SMA-iMX6.rfp  
**Assembly:** E9697A96101R  
**Ref Des:**  
**Description:** Freescale i.MX6 SMARC Module

**Failure Rate:** 1.352008  
**MTBF (hrs):** 739,640  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Unit Failure Rate	Quantity	Total Failure Rate
E1123510400H	Capacitor	C14~C17, C19,C20,C 22,C24,C2 5,C29,C31 ,C33,C35, C37~C39, C41,C119 ~C122,C1 24~C129, C138~C16 8,C171,C1 84~C186, C188~C20 9,C211,C2 21~C233, C235~C25 3,C255~C 258,C260, C261,C26 3,C264,C2 66,C268~ C270,C27 2,C275~C 279,C282, C287,C29 2,C296~C 298,C318, C324,C32 9,C335,C3 38,C339,C 344	0.000376	178	0.068230
E1125510300H	Capacitor	C26,C27,C 281,C286, C291,C32 8,C334,C3 43,C349,C 357,C375, C404,C40 5	0.000376	13	0.005231
E1127418100H	Capacitor	C340	0.000376	1	0.000473
E1127420000H	Capacitor	C42,C43	0.000376	2	0.000888
E1127422000H	Capacitor	C299,C30 0	0.000376	2	0.000888
E1127422100H	Capacitor	C347,C35 3	0.000376	2	0.000888
E1127427000H	Capacitor	C273,C27 4	0.000376	2	0.000888
E1181622780H	Capacitor	EC1	0.001581	1	0.002088
E121220102CH	Inductor	L9	0.001648	1	0.002154
E1212202220H	Inductor	L1,L2	0.001648	2	0.004006
E1212202227H	Inductor	L3~L7	0.001648	5	0.009355
E1213101215H	Inductor	B14	0.001648	1	0.002154

**File Name:** SMA-iMX6.rfp  
**Assembly:** E9697A96101R  
**Ref Des:**  
**Description:** Freescale i.MX6 SMARC Module

**Failure Rate:** 1.352008  
**MTBF (hrs):** 739,640  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Unit Failure Rate	Quantity	Total Failure Rate
E1213102410H	Inductor	B17	0.001648	1	0.002154
E1213103000H	Inductor	B1,B4~B10	0.001648	8	0.014573
E1213106012H	Inductor	B11~B13, B15,B16	0.001648	5	0.009355
E1231302463H	Miscellaneous	Y1	0.028000	1	0.084690
E1231332720H	Miscellaneous	Y4	0.028000	1	0.084690
E1301055140R	Semiconductor	D1	0.002598	1	0.003592
E1301075140R	Semiconductor	D2,D3	0.002598	2	0.006590
E1315013810R	Semiconductor	Q1	0.007488	1	0.010534
E1315155510H	Semiconductor	Q2,Q3	0.007488	2	0.019251
E1314150110H	Integrated Circuit	U19,U26	0.043803	2	0.146310
E14S3302000H	Integrated Circuit	U25	0.043803	1	0.085185
E14S3717800H	Integrated Circuit	U17,U18, U20	0.043803	3	0.203118
E14S3832600H	Integrated Circuit	U14	0.026019	1	0.039137
E14S4000600H	Integrated Circuit	U1	0.021707	1	0.042214
E14S4461000H	Integrated Circuit	U10	0.026019	1	0.039137
E14S4930600H	Integrated Circuit	U13,U23	0.026019	2	0.070451
E14S6104G52H	Integrated Circuit	U2,U3	0.011063	2	0.030706
E14S6200040H	Integrated Circuit	U6	0.011063	1	0.017173
E14S6324321H	Integrated Circuit	U7	0.043803	1	0.085185
E14S6324322H	Integrated Circuit	U15	0.043803	1	0.085185
E14S8202401H	Integrated Circuit		0.043803	1	0.085185
E14S9811500H	Integrated Circuit	U12	0.043803	1	0.085185
E1907A96101RO-W1	Connection		0.006376	1	0.012150